

WHAT IS CLAIMED IS:

1. A mobile communication system comprising:

5 a multicast router which receives an information signal addressed to a predetermined multicast group transmitted from a transmitter and which can make a copy of the received information signal and can distribute it to a network downstream thereof when a mobile terminal
10 belonging to the multicast group is present downstream of the router;

15 a data link layer switch which receives the information signal distributed from the multicast router and which can distribute a copy of the received information signal only to a multicast distribution path in which a mobile terminal belonging to the multicast group is present;

20 a radio base station which is connected to the data link layer switch and which can distribute the information signal distributed by the data link layer switch to a radio network downstream thereof; and

25 a mobile terminal which receives the information signal distributed by the radio base station,

the mobile terminal comprising:

station switching detection means which detects that the radio base station connected to the terminal itself has been switched;

5 router switching detection means which detects that the multicast router connected to the terminal itself has been switched;

10 establishment request transmission means which transmits a path establishing request for requesting at least the data link layer switch to establish a multicast distribution path for distributing the information signal to the radio base station connected to the terminal itself;

15 withdrawal request transmission means which transmits a withdrawal request for requesting at least the multicast router to withdraw from the multicast group to which the mobile terminal itself belongs; and

20 transmission control means which transmits a first instruction signal for instructing the establishment request transmission means to transmit the path establishing request and a second instruction signal for instructing the withdrawal request transmission means to transmit the withdrawal request, depending on the detection
25 by the station switching detection means, wherein:

when the station switching detection means

detects the switching of the radio base station but the router switching detection means does not detect the switching of the multicast router, the transmission control means sequentially outputs the first instruction signal, the second instruction signal, and the first instruction signal again; and

when the station switching detection means detects the switching of the radio base station and the router switching detection means detects the switching of the multicast router, the transmission control means outputs the first instruction signal to transmit the path establishing request to the new multicast router and thereafter outputs the second instruction signal to transmit the withdrawal request to the previous multicast router.

2. A mobile communication system according to Claim 1, wherein the data link layer switch comprises:

path establishing means which establishes a multicast distribution path in a path according to the path establishing request when the path establishing request is received; and

distribution path reconfiguration means which distributes a presence check request to a

network downstream thereof when the presence check request is received and reconfigures the multicast distribution path according to a path establishing request returned in response to the distribution.

5 3. A mobile terminal belonging to a multicast group and receiving an information signal transmitted on a multicast bases through a multicast router, a data link layer switch, and a radio base station, comprising:

10 station switching detection means which detects that the radio base station connected to the terminal itself has been switched;

 router switching detection means which detects that the multicast router connected to the
15 mobile terminal itself has been switched;

 establishment request transmission means which transmits a path establishing request for requesting at least the data link layer switch to establish a multicast distribution path for
20 distributing an information signal to the radio base station connected to the mobile terminal itself;

 withdrawal request transmission means which transmits a withdrawal request for requesting at
25 least the multicast router to withdraw from the multicast group connected to the mobile terminal

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itself, to which the terminal belongs; and

transmission control means which transmits a
first instruction signal for instructing the
establishment request transmission means to
5 transmit the path establishing request and a
second instruction signal for instructing the
withdrawal request transmission means to transmit
the withdrawal request, in response to the
detection by the station switching detection means,
10 wherein:

when the station switching detection means
detects the switching of the radio base station
but the router switching detection means does not
detect the switching of the multicast router, the
15 transmission control means sequentially outputs
the first instruction signal, the second
instruction signal, and the first instruction
signal again; and

when the station switching detection means
20 detects the switching of the radio base station
and the router switching detection means detects
the switching of the multicast router, the
transmission control means outputs the first
instruction signal to transmit the path
25 establishing request to the new multicast router
and thereafter outputs the second instruction

signal to transmit the withdrawal request to the previous multicast router.

4. A mobile communication method for a mobile terminal belonging to a multicast group to receive an information signal transmitted on a multicast bases through a multicast router, a data link layer switch, and a radio base station, the method comprising:

a station switching detection step at which station switching detection means of the mobile terminal detects that the radio base station connected to the mobile terminal itself has been switched;

a router switching detection step at which router switching detection means of the mobile terminal detects that the multicast router connected to the mobile terminal itself has been switched;

a first updating step at which, when the station switching detection means detects the switching of the radio base station but the router switching detection means does not detect the switching of the multicast router, establishment request transmission means of the mobile terminal transmits a path establishing request for requesting the data link layer switch to establish

a path for distributing an information signal to the radio base station connected to the mobile terminal itself, at which withdrawal request transmission means of the mobile terminal successively transmits a withdrawal request for requesting the multicast router to withdraw from the multicast group to which the mobile terminal itself belongs, and at which the establishment request transmission means transmits the path establishing request; and

a second updating step at which, when the station switching detection means detects the switching of the radio base station and the router switching detection means detects the switching of the multicast router, the establishment request means transmits the path establishing request to the new multicast router, and the withdrawal request transmission means transmits the withdrawal request to the previous multicast router.

5. A mobile communication system comprising:

a multicast router which receives an information signal addressed to a predetermined multicast group transmitted from a transmitter and which can make a copy of the received information

signal and can distribute it to a network downstream thereof when a mobile terminal belonging to the multicast group is present downstream of the router;

5 a data link layer switch which receives the information signal distributed by the multicast router and which can distribute a copy of the received information signal only to a multicast distribution path in which a mobile terminal
10 belonging to the multicast group is present;

 a radio base station which is connected to the data link layer switch and which can distribute the information signal distributed by the data link layer switch to a radio network
15 downstream thereof; and

 a mobile terminal which receives the information signal distributed by the radio base station,

 the mobile terminal comprising:

20 station switching detection means which detects that the radio base station connected to the mobile terminal itself has been switched;

 router switching detection means which detects that the multicast router connected to the
25 mobile terminal itself has been switched;

 establishment request transmission means

which transmits a path establishing request for requesting at least the data link layer switch to establish a multicast distribution path for distributing the information signal to the radio base station connected to the mobile terminal itself;

Withdrawal request transmission means which transmits a withdrawal request for requesting at least the multicast router to withdraw from the multicast group to which the mobile terminal itself belongs; and

transmission control means which transmits a first instruction signal for instructing the establishment request transmission means to transmit the path establishing request and a second instruction signal for instructing the withdrawal request transmission means to transmit the withdrawal request, in response to the detection by the station switching detection means and the router switching detection means, wherein:

when the station switching detection means detects the switching of the radio base station but the router switching detection means does not detect the switching of the multicast router, the transmission control means sequentially outputs the first instruction signal, the second

instruction signal, and the first instruction
signal again; and

when the station switching detection means
detects the switching of the radio base station
and the router switching detection means detects
the switching of the multicast router, the
transmission control means outputs the first
instruction signal to transmit the path
establishing request to the new multicast router
and thereafter sequentially outputs the second
instruction signal and the first instruction
signal to transmit the withdrawal request and the
path establishing request to the previous
multicast router.

6. A mobile communication system according
to Claim 5, wherein the mobile terminal further
comprises:

connection strength determination means
which determines whether the strength of
connection with the radio base station connected
to the mobile terminal itself is equal to or
higher than a predetermined threshold;

router detection means which detects the
presence of multicast routers connected to the
radio base station and a radio base station
adjacent to the radio base station; and

recording means which records information identifying the multicast router which has established a multicast distribution path depending on the establishment request transmission means, wherein:

in cases where the connection strength determination means determines that the strength of connection with the connected radio base station is lower than the predetermined threshold when the router detection means detects the presence of a multicast router which is not recorded in the recording means, the transmission control means outputs the first instruction signal to the detected multicast router and records information identifying the detected multicast router in the recording means; and

in cases where the connection strength determination means determines that the strength of connection with the connected radio base station has become equal to or higher than the threshold again after the recording, the transmission control means outputs the second instruction signal to all multicast routers excluding the connected multicast router and deletes information identifying the multicast routers to which the second instruction signal has

been output from the recording means.

7. A mobile terminal belonging to a multicast group and receiving an information signal transmitted on a multicast bases through a multicast router, a data link layer switch, and a radio base station, comprising:

station switching detection means which detects that the radio base station connected to the mobile terminal itself has been switched;

router switching detection means which detects that the multicast router connected to the mobile terminal itself has been switched;

establishment request transmission means which transmits a path establishing request for requesting at least the data link layer switch to establish a multicast distribution path for distributing an information signal to the radio base station connected to the mobile terminal itself;

withdrawal request transmission means which transmits a withdrawal request for requesting at least the multicast router to withdraw from the multicast group connected to the mobile station itself, to which the terminal belongs; and

transmission control means which transmits a first instruction signal for instructing the

establishment request transmission means to
transmit the path establishing request and a
second instruction signal for instructing the
withdrawal request transmission means to transmit
5 the withdrawal request, in response to the
detection by the station switching detection means
and the router switching detection means, wherein:

when the station switching detection means
detects the switching of the radio base station
10 but the router switching detection means does not
detect the switching of the multicast router, the
transmission control means sequentially outputs
the first instruction signal, the second
instruction signal, and the first instruction
15 signal again; and

when the station switching detection means
detects the switching of the radio base station
and the router switching detection means detects
the switching of the multicast router, the
20 transmission control means outputs the first
instruction signal to transmit the path
establishing request to the new multicast router
and thereafter sequentially outputs the second
instruction signal and the first instruction
25 signal to transmit the withdrawal request and the
path establishing request to the previous

multicast router.

8. A mobile terminal according to Claim 7, further comprising:

connection strength determination means
5 which determines whether the strength of connection with the radio base station connected to the mobile terminal itself is equal to or higher than a predetermined threshold;

router detection means which detects the
10 presence of multicast routers connected to the radio base station and a radio base station adjacent to the radio base station; and

recording means which records information identifying the multicast router which has
15 established a multicast distribution path with the establishment request transmission means, wherein:

in cases where the connection strength determination means determines that the strength of connection with the connected radio base
20 station is lower than the predetermined threshold when the router detection means detects the presence of a multicast router which is not recorded in the recording means, the transmission control means outputs the first instruction signal
25 to the detected multicast router and records information identifying the detected multicast

router in the recording means; and

in cases where the connection strength determination means determines that the strength of connection with the connected radio base station has become equal to or higher than the threshold again after the recording, the transmission control means outputs the second instruction signal to all multicast routers excluding the connected multicast router and deletes information identifying the multicast routers to which the second instruction signal has been output from the recording means.

9. A mobile communication method for a mobile terminal belonging to a multicast group to receive an information signal transmitted on a multicast bases through a multicast router, a data link layer switch, and a radio base station, the method comprising:

a station switching detection step at which station switching detection means of the mobile terminal detects that the radio base station connected to the mobile terminal itself has been switched;

a router switching detection step at which router switching detection means of the mobile terminal detects that the multicast router

connected to the mobile terminal itself has been switched;

5 a third updating step at which, when the station switching detection means detects the switching of the radio base station but the router switching detection means does not detect the switching of the multicast router, establishment request transmission means of the mobile terminal transmits a path establishing request for
10 requesting the data link layer switch to establish a path for distributing an information signal to the radio base station connected to the mobile terminal itself, at which withdrawal request transmission means of the mobile terminal
15 successively transmits a withdrawal request for requesting the multicast router to withdraw from the multicast group to which the mobile terminal itself belongs, and at which the establishment request transmission means transmits the path
20 establishing request; and

a fourth updating step at which, when the station switching detection means detects the switching of the radio base station and the router switching detection means detects the switching of
25 the multicast router, the establishment request means transmits the path establishing request to

the new multicast router, at which the withdrawal request transmission means successively transmits the withdrawal request to the previous multicast router, and at which the establishment request transmission means further transmits the path establishing request to the previous multicast router thereafter.

10. A mobile communication method according to Claim 9, further comprising:

a connection strength determination step at which connection strength determination means of the mobile terminal determines whether the strength of connection with the radio base station connected to the mobile terminal itself is equal to or higher than a predetermined threshold;

a router detection step at which router detection means of the mobile terminal detects the presence of multicast routers connected to the radio base station and a radio base station adjacent to the radio base station;

a recording step at which recording means of the mobile terminal records information identifying the multicast router which has established a multicast distribution path with the establishment request transmission means;

a fifth updating step at which, in cases

where the connection strength determination step determines that the strength of connection with the connected radio base station is lower than the predetermined threshold when the router detection step detects the presence of a multicast router which is not recorded in the recording means, the transmission control means outputs the first instruction signal to the detected multicast router and records information identifying the detected multicast router in the recording means; and

a sixth updating step at which, in cases where the connection strength determination step determines that the strength of connection with the connected radio base station has become equal to or higher than the threshold again after the recording, the transmission control means outputs the second instruction signal to all multicast routers excluding the connected multicast router and deletes information identifying the multicast routers to which the second instruction signal has been output from the recording means.